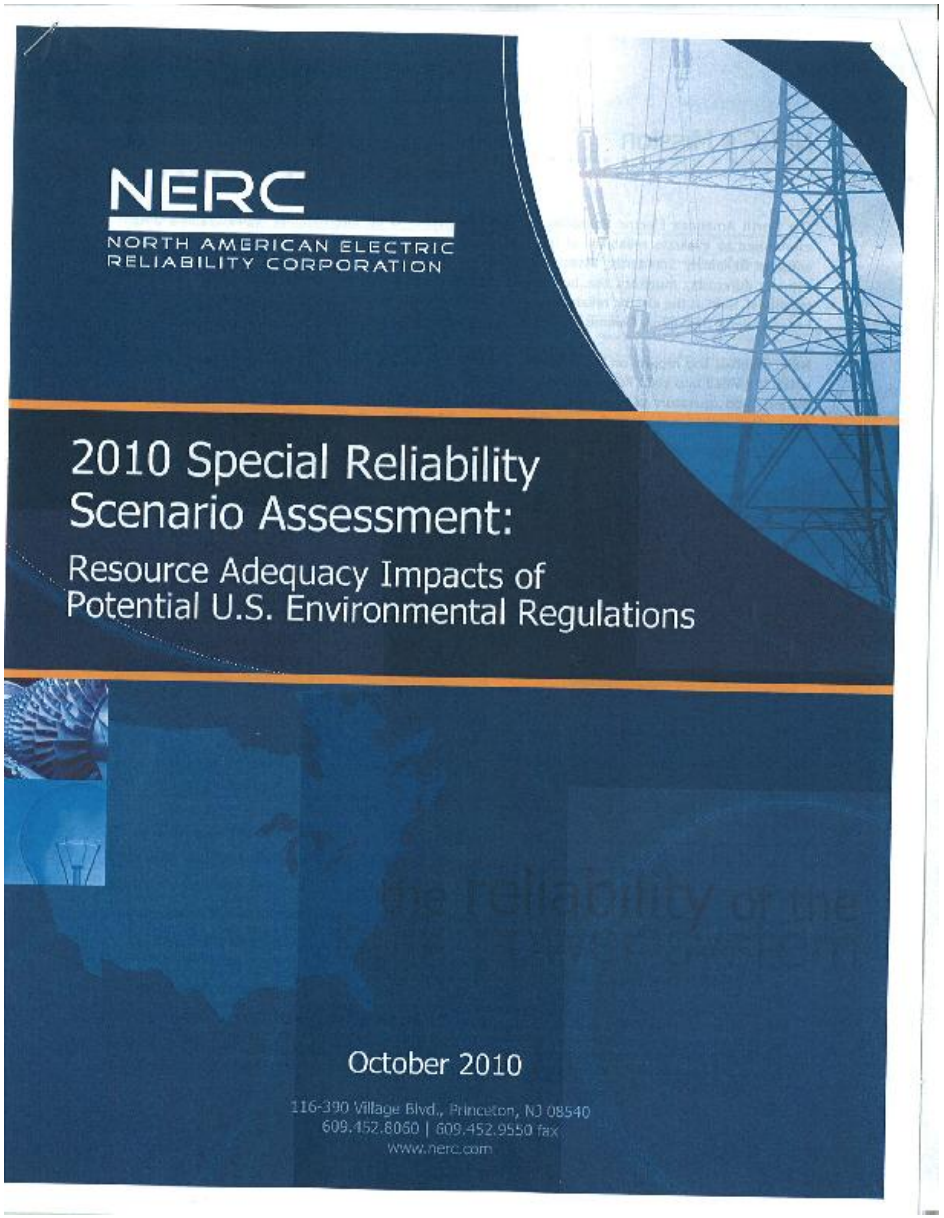


Major NERC Study Findings and Insights for ERCOT

Tom Hewson
Principal
Energy Ventures Analysis Inc
Arlington, VA
703-276-8900

June 22, 2011

Public Utility Commission of Texas Workshop

NERC Study

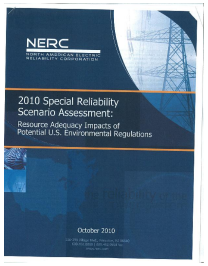
- EVA conducted compliance and retirement analysis for NERC study– Comments today are my own- not NERC's

- Study Scope
  - Excludes future carbon legislation/regulation from analysis (Brattle and EEI Studies assume carbon)
  - Speculates on final outcome of 4 impending EPA rules
  - Assumes that all control measures can be financed, permitted, constructed and placed online by regulation compliance date
  - Study estimates exclude already previously committed and announced unit retirements (13 GW)
  - Assumes future coal ash regulations will have no effect on existing ash reuse programs

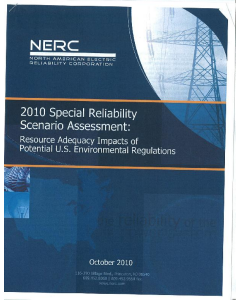
- Draft EPA Rulemaking Affecting Existing Utility Capacity Decisions
  - Coal Combustion Residuals Rule (Draft June 21, 2010, Final 3Q 2011)
  - Clean Air Transport Rule (Draft July 6, 2010, Final July 2011)
  - 316 B Cooling Water Intake Structure Rule (Draft April 20, 2011, Final July 2012)
  - Utility Air Toxics Rule (Draft May 3, 2011, Final Nov 2011)

- Project Utility Compliance Decisions – Control investment vs. Retirement

- Quantify Impact on Grid Reliability of unit retirements



EVA Study Methodology



- Develop range of potential outcomes of pending EPA rulemaking and cost–Moderate and Strict cases

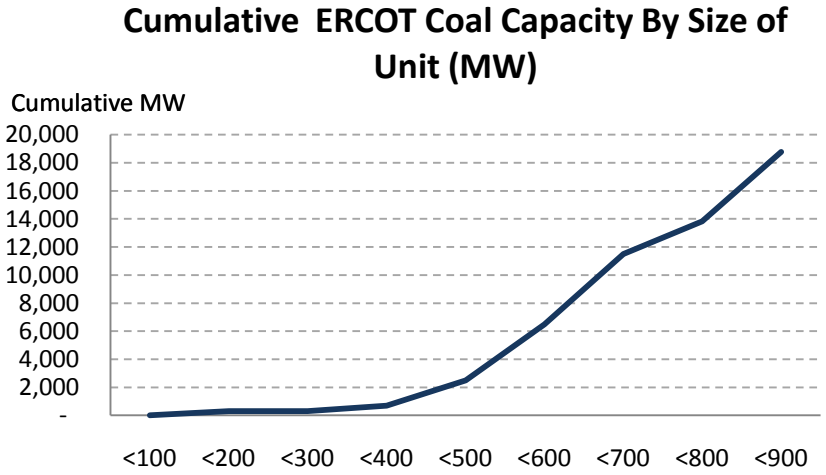
- Develop unit environmental retrofit control capital and operating cost estimates-FGD, Fabric Filters, cooling tower, wastewater treatment upgrades, dry ash conversion costs, and ash landfill disposal costs.
  - Assumes average retrofit difficulty, onsite ash disposal and no cost run-ups in labor or material costs.
  - No detailed study made of site conditions and boiler layouts that can change capital costs.

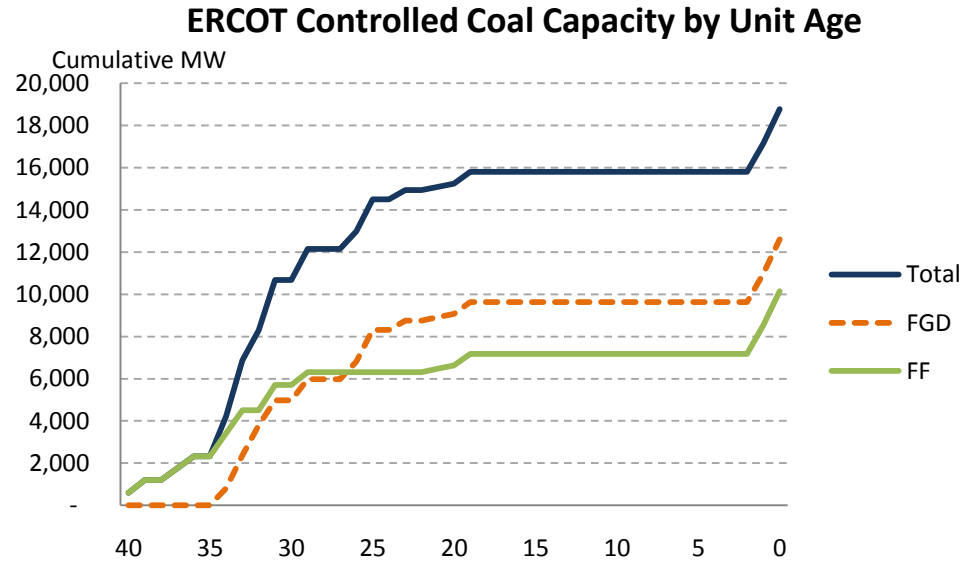
- Project capital and power production costs for unit replacement capacity (NGCC for baseload, CT for peaking)
  - Applied EVA summer 2010 fuel (coal, gas), unit specific transportation rates and regional natural gas basis differential forecasts

- Retire capacity if replacement power costs are less than controlled unit costs for remainder of generating unit lifetime.

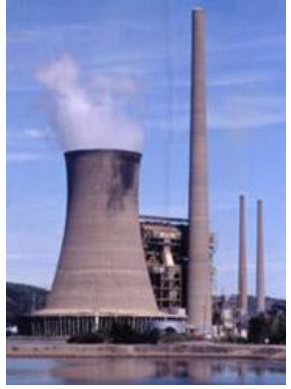
- Assess the individual and cumulative impact of implementing all four EPA rules

ERCOT Coal Assets- Post 1970's Large Units, Many with Post Combustion Controls Already in Place





316 B Cooling Water Intake Structures



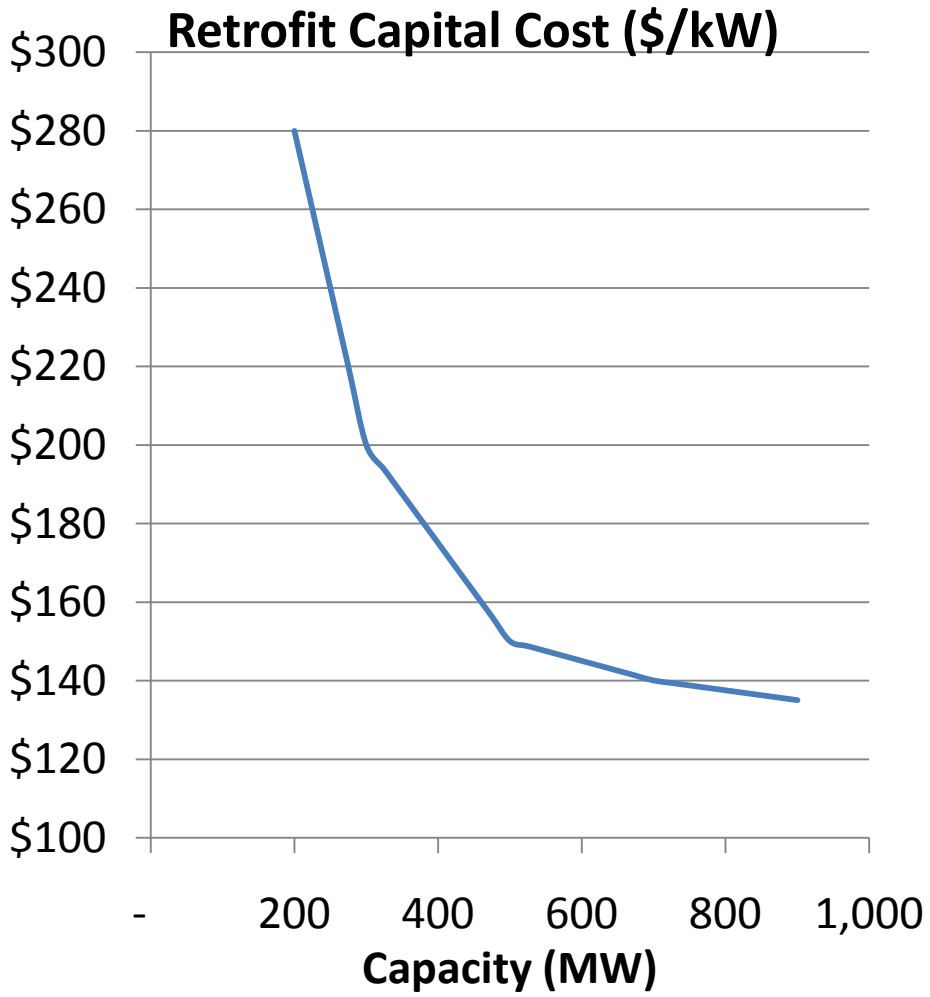
- EPA adopted original rule in 2004 but rule overturned in 2007

- April 20, 2011- EPA issues draft technology standards
  - Standards apply to all sources with design water intake flow of greater than 2 MGD of which more than 25 percent is used for cooling water purposes.
  - Sets Impingement Standards-- Can be met by retrofitting modified Ristroph screens or having less than 0.5 feet per second water intake velocity
  - States to set Entrainment Standards on a facility specific basis- Selection should take reliability impacts into account. EPA economic impact cost analysis assumes wet cooling towers are best technology available.

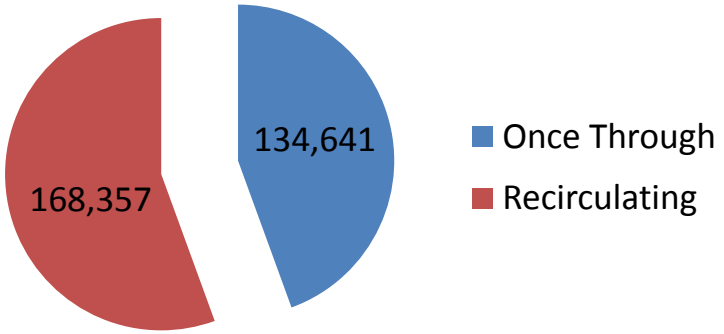
- July 27, 2012- Final technology standards

- 754 Coal units have once through cooling systems
  - NERC study assumes that these units must either convert to cooling tower systems or retire.

Cooling Water Intake Structures



Coal Capacity (MW)



Conversion capital costs can vary significantly based upon site layout, geology, and temperature.

ERCOT Study assumes $200/kW

316(b) Cooling Water Intake Structures

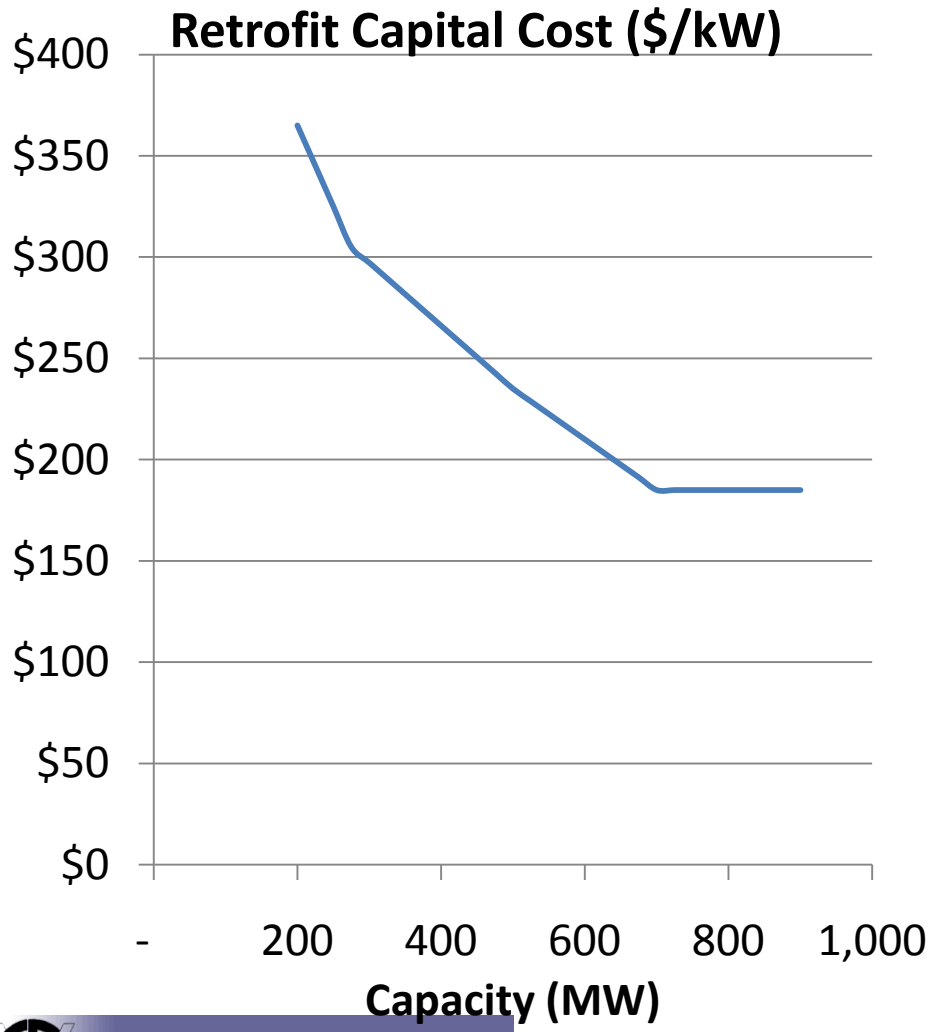
- ERCOT Impacts
  - 14.2 GW (61%) of coal capacity already have recirculating cooling water systems and would be unaffected by this rule.
  - 9.1 GW of coal capacity have once through cooling systems and must make conversion investments to comply. Study concluded that system conversion costs were less than replacement costs.
  - NERC Study estimates 28-29 units (5,055-5,295 MW) of existing oil/gas steam capacity would retire in lieu of converting to recirculating cooling water systems
  - Systems converting to recirculating cooling water systems would be derated by 316-322 MW.

- Prior DOE 2008 Report estimated that 10,919 MW of ERCOT fossil generating capacity (coal & gas) was at risk for closure. This amount includes older steam capacity that were subsequently closed. Analysis based upon study assumption that facilities operating at less than 35% CF would elect to close.

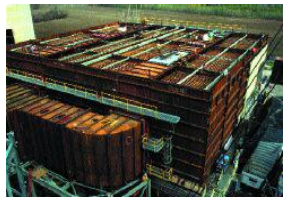
EPA Draft Air Toxics Rule

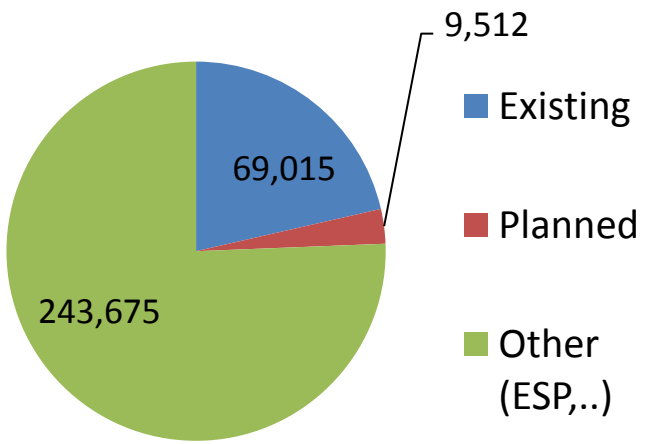
- Draft EPA rule published May 3, 2011
- Final Air Toxics Rule must be promulgated by November 16, 2011
- Clean Air Act requires EPA to implement limits within 3 years of adoption but provides for a one year delay by President waiver
- Sets very strict existing coal unit acid gas emission rate limitations (0.002 lb HCl/MMBtu) or alternative SO2 rate limit (0.2 lb SO2/MMBtu) that would effectively force FGD retrofits on most unscrubbed bituminous coal capacity.
- Sets very strict existing coal unit particulate rate limitations (0.03 lb PM/MMBtu) that will likely force fabric filter retrofits on most existing coal capacity. EPA believes that some coal units can met rate limit without further investment.
- Sets strict existing coal unit mercury limit for bituminous/sub-bituminous coal (1 lb/TBtu) and lignite coal (4.0 lb/TBtu). Bituminous/sub-bituminous coal unit limitations likely to be increased to near 1.2 lb/TBtu because of EPA data errors.

Coal Particulate Controls (MW)



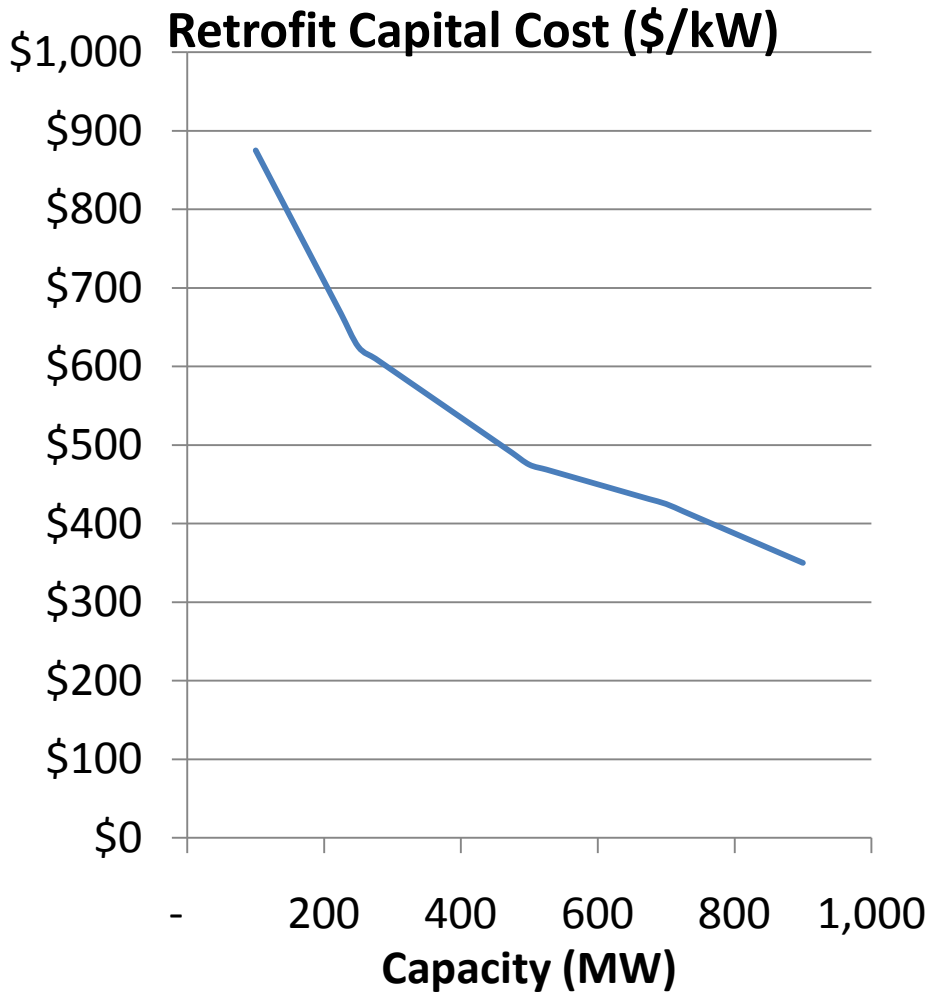
Fabric Filter



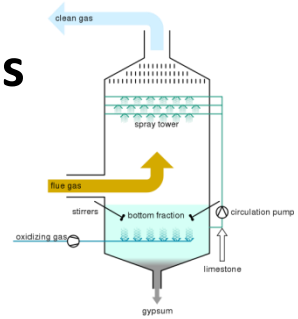


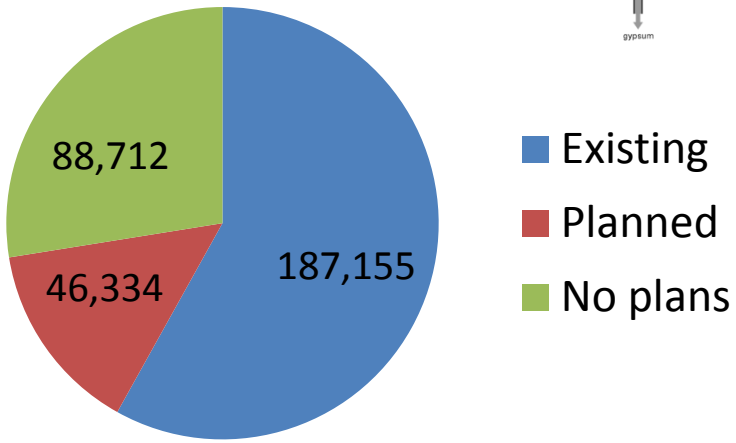
ERCOT---10.2 GW (54%) of its coal capacity already has fabric filter controls.

Coal FGD Controls (MW)



FGD Controls

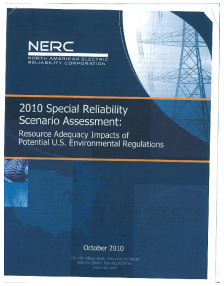




ERCOT--12.6 GW (67%) already have and 0.9 GW (5%) have announced plans to have FGD controls in place by 2015.

NERC Study Projected Utility Air Toxics Rule

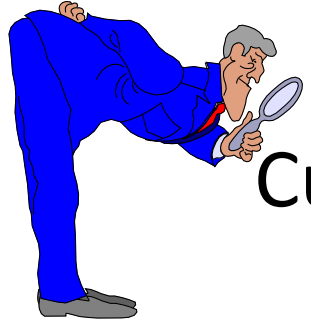
- ERCOT Impacts
  - 18.8 GW of existing coal capacity
    - 12.6 GW (67%) already have and 0.9 GW (5%) have announced plans to have FGD controls in place by 2015.
    - 5.3 GW (28%) coal capacity would be forced to place additional SO2/acid gas controls in place by 2015 or retire.
    - 10.2 GW (54%) already have fabric filter controls.
    - Up to 8.6 GW (46%) may require additional particulate control investments or retire.
  - Needed control retrofits will require large capital investments and will add to coal power production costs. However, these environmental control costs are less than full unit replacement costs. Coal units should elect to retrofit additional environmental control measures in lieu of retirement.
  - Retrofit environmental control measures should derate unit output by 73 MW



Coal Combustion Residuals/ Clean Air Transport Rule

- Coal Combustion Rule can potentially affect most coal-fired facilities
  - US power industry produces 136 Million tons per year of coal ash & solid byproducts
  - June 21, 2010- EPA issues draft rule to regulate coal ash disposal under either Subtitle C or D under Resource Conservation & Recovery Act.
  - Final EPA rule anticipated for 3Q 2011, start implementation 2013-2015 with full implementation by 2018
  - Poses new marketing challenges for plants that currently resell 20 million tons of coal ash per year. Texas utilities reported ash/gypsum sales/recycled was roughly 0.9 million tons of ash in a year
- NERC Study assumes conversion of all wet ash handling systems to dry handling systems and onsite ash disposal at costs ranging from $15-37.50/ton
- No ERCOT coal units are projected to retire from Coal Combustion rule

- EPA Preferred Alternative in July 2010 draft Clean Air Transport Rule would not force any additional retirements in ERCOT. Texas was subject only to the seasonal NOx program rules.



Cumulative Impact of 4 EPA Rulemakings

- NERC Study ERCOT Impacts
  - Study estimates 28-29 units (5,055-5,295 MW) of existing ERCOT oil/gas steam capacity would retire.
  - Environmental control retrofits would derate ERCOT unit capacity by 366-480 MW.

- EVA Concerns
  - EPA has not examined cumulative impacts of all their rulemaking
  - Increase risk of short-term natural gas market disruptions from near 60 GW of coal retirements– These fuel market disruptions may affect Texas markets
  - Compliance schedule risk– Can affected sources permit, engineer, finance and bring control projects online within CAAA deadlines?